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Book Review

Survival Analysis Using SAS: A Practical Guide. Second Edition

By Paul D. Allison

ISBN 978-1-59994-640-5, SAS Press, Cary, North Carolina (Telephone: 1-800-727-3228, Fax: 1-919-677-8166, E-mail: sasbook@sas.com, World Wide Web: http://support.sas.com/publishing), 2010, 324 pp., $47.95 Paperback

The second edition of *Survival Analysis Using SAS: A Practical Guide* is a terrific entry-level book that provides information on analyzing time-to-event data using the SAS system. In the 15 years since the first edition of the book was published, statistical methods for survival analysis and the SAS system have both evolved. For instance, much progress has been made in the application of Bayesian methods in survival analysis (1). By addressing such changes, the new edition offers a highly appreciated update.

This book has several strengths. First, it is well-organized and quite clearly written. Second, the material is thorough and accurate. For example, the author does not gloss over challenging facets of survival analysis, such as left truncation, tied event times, and time-dependent covariates. Rather, he discusses the complexity of such issues with characteristic clarity. Third, this book provides extensive SAS code and examples that can be easily adapted for use in epidemiologic research settings. In addition, the author provides detailed explanations of SAS output. Importantly, he includes thorough descriptions and examples of how to graphically visualize data summaries using SAS and also includes the relevant SAS code or self-contained macros.

The structure of this book is as follows. In chapters 1 and 2, the basic foundations of survival data and methods are provided. They are followed by nonparametric comparisons of survival curves in chapter 3. The core chapters are 4, 5, and 7, which present regression models for survival data in great detail. These chapters cover the ubiquitous semiparametric Cox proportional hazards model, parametric survival models (e.g., the Weibull model), and discrete-time survival models (e.g., pooled logistic regression). Of note, these core chapters offer a detailed discussion of maximum likelihood and partial likelihood estimation. Chapters 6 and 8 cover a number of additional topics, including competing risks and repeated events. Finally, chapter 9 provides a brief discussion of how to select the appropriate methods when embarking on a new analysis.

Dr. Allison is a sociologist by profession, and his approach is consistent with epidemiologic thinking. This is not surprising, given that sociology and epidemiology are allied sciences, both sharing the common ground of demography. Although Allison does not always use language with which epidemiologists are familiar, the basics of cohort study design and systematic errors are handled appropriately. Additionally, as would an epidemiologist, he explicitly refrains from using the algorithmic model-building options available in SAS.

After using the book as the primary text in a time-to-event class for epidemiology doctoral students at the University of North Carolina, we identified a few additional areas that would be useful for epidemiologic applications. First, analysis of survival data using the Poisson model could have been included. (This omission is common to almost all modern books on survival analysis.) Second, although the topic of competing risks is discussed in chapter 6, newer methods for regression analysis of competing risk data are not presented (2). Third, the text does not mention the tendency of standard survival methods to produce biased results when time-varying confounders are affected by prior exposures (3). Finally, although the topic of informative censoring is discussed, the approach for obtaining bounds in a simple sensitivity analysis does not cohere with common epidemiologic practice: Allison's example does not assess the effect of informative censoring by exposure category. In fairness, a longer listing of such refined points could be constructed for just about every other entry-level book on survival analysis.

This book can be used either as a self-learning resource or as a textbook for a didactic course. Other examples of good self-learning survival analysis texts include Kleinbaum and Klein's *Survival Analysis: A Self-Learning Text* (4) and Cantor's *SAS Survival Analysis Techniques for Medical Research* (5). However, neither of these other self-learning resources combines survival analysis methods and SAS code as well as the text by Allison does. Other examples of good texts for entry-level didactic courses include Collett's *Modelling Survival Data in Medical Research* (6) and (the more technical) Klein and Moeschberger's *Survival Analysis for Censored and Truncated Data* (7). Both offer more extensive discussions of theory and are useful supplements to Allison's applied approach.

True to its title, the book is practical. Although a familiarity with the SAS system and a solid foundation in statistical modeling for linear regression are needed for full comprehension, this text is highly recommended for the epidemiologist looking to make intelligent analytic decisions or the student looking to learn the basic concepts and tools of survival analysis. *Survival Analysis Using SAS: A Practical Guide* strikes just the right balance of explanation and application.

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Nora E. Rosenberg and Leah Sirkus
(e-mail: Sirkus@email.unc.edu)
Department of Epidemiology, School of Public Health, University of North Carolina at Chapel Hill, Chapel Hill, NC 27599

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What is SAS Survival Analysis,Procedures of Survival Analysis in SAS,examples of Survival Analysis, PROC ICLIFETEST,PROC ICPHREG,PROC LIFETEST,PROC PHREG.Â Here, we will learn what are the procedures used in SAS survival analysis: PROC ICLIFETEST, PROC ICPHREG, PROC LIFETEST, PROC SURVEYPHREG, PROC LIFEREG, and PROC PHREG with syntax and example. Moreover, we will discuss SAS/STAT survival analysis example for better understanding. So, letâ€™s start with SAS Survival Analysis Procedures. Top 6 SAS Survival Analysis Procedures. Keeping you updated with latest technology trends, Join DataFlair on Telegram. 2. What is SAS Survival Analysis?